

## Description

# ONE-PIECE INTEGRATED SNAP FASTENING MECHANISM

### BACKGROUND OF INVENTION

[0001] The present invention in its broadest aspect relates generally to a mechanism for fastening a first member to a second member and, more particularly, to a one mechanism for attaching body molding to a side panel of a motor vehicle.

[0002] A common method for decorating various consumer articles, such as motor vehicles, refrigerators, furniture and the like, is to add one or more pieces of molding or decorative trim to the housing structure of such articles. The decorative molding or trim is provided not only to enhance the appearance of the particular article, but to provide some protection against dings, scratches, normal wear and tear and, in the case of a motor vehicle, damage to the vehicle from opening doors, run away grocery carts and so forth. Often the molding or trim is attached to the

particular housing structure by use of an adhesive or a fastening device which typically includes multiple pieces and a complicated attachment mechanism. Many of the known fastening devices include multiple components such as some type of member which clips or otherwise attaches to another member associated with the molding or trim piece and is then inserted into an aperture associated with the article housing structure for attachment thereto.

See, for example, U.S. Patent Nos. 6,074,150 and 6,481,682. Fastening devices which include multiple parts often result in lost parts further complicating the attachment effort. Other known fastening devices, although integrally formed with the body molding, do not provide the same flexibility and resiliency offered by the present mechanism, nor do they provide a construction which is easy to fabricate, easy to install, and is sufficiently strong to resist breakage during installation. See, for example, U.S. Patent Nos. 4,039,215; 4,363,839; and 6,095,594.

[0003] It is therefore desirable to provide a simple fastening mechanism for attaching a first member to a second member and, more particularly, a fastening mechanism which can be integrally formed with the first member and which requires no additional parts for attachment to the

second member.

[0004] Accordingly, the present invention is directed to overcoming one or more of the problems as set forth above.

## **SUMMARY OF INVENTION**

[0005] The present invention relates to a onefastening mechanism which is preferably integrally formed with or otherwise attached to the molding or trim piece which is to be fastened to a housing structure such as the side panel of a motor vehicle. The present fastening mechanism includes a first opening which extends substantially the full length of the fastener and a second opening which extends transversely to the first opening and through the entire mechanism. The present mechanism is sized and shaped with respect to the first and second openings so as to be sufficiently flexible and resilient to compress when inserted into an aperture associated with a housing structure or vehicle side panel when pressure is applied thereto, yet sufficiently resilient to return substantially to its original position when the pressure is removed. The present mechanism is provided with resiliently flexible barbs or detents which engage the periphery of the aperture and hold it in place therewithin thereby securing the molding or trim piece to the housing structure.

## **BRIEF DESCRIPTION OF DRAWINGS**

- [0006] Fig. 1 is a perspective view of a typical vehicle molding or trim piece illustrating use of a snap fastening mechanism constructed in accordance with the teachings of the present invention, the present fastening mechanism being integrally formed with the molding or trim piece.
- [0007] Fig. 2 is a side elevational view of the fastening mechanism of Fig. 1 illustrating one of the opposed close side portions thereof.
- [0008] Fig. 3 is a crossview of the distal end of the present fastening mechanism taken along line 3of Fig. 2.
- [0009] Fig. 4 is a perspective view of the fastening mechanism of Figs. 1 illustrating the transverse opening extending through one side portion thereof and the barbs or detents formed thereby.
- [0010] Fig. 5 is a cutside elevational view of the present fastening mechanism that has been inserted into an aperture associated with a typical housing structure such as a vehicle side panel.
- [0011] Fig.6 is a crossview of the distal end of another embodiment of the present fastening mechanism.

## **DETAILED DESCRIPTION**

[0012] Referring to the drawings wherein like numerals refer to like parts, the number 50 in Fig. represents a typical vehicle molding or trim member 50 having a plurality of fastening members 10 integrally formed therewith, the fastening members 10 being formed and constructed in accordance with the teachings of the present invention. As best illustrated in Figs. 1 the fastening member 10 is of a one construction and is preferably integrally formed or otherwise attached to the molding or trim piece 50 for insertion into apertures associated with a housing structure such as the side panel of a motor vehicle. The present invention contemplates a one mechanism for attaching a first member to a second member such as molding 50 to the side panel of a vehicle. The fastening mechanism 10 is sufficiently flexible so that it will compress sufficiently when inserted into a corresponding aperture associated with the second member or a vehicle side panel when pressure is applied at its distal end thereby allowing the fastening member to be received within the aperture as will be hereinafter explained, yet sufficiently resilient to return substantially to its original shape when such pressure is removed. The present mechanism is provided with a plurality of barbs or detents 32 which hold it in place

within the aperture thereby securing the molding 50 or other first member to a second member such as the side panel of a motor vehicle as will be likewise hereinafter further explained.

- [0013] The present invention is particularly suited for attaching molding or trim to side panels of motor vehicles. Although the fastening mechanism 10 can be separate from the molding or trim piece 50, it is preferable if the one-fastening member 10 be integrally attached to the molding or trim piece 50. Indeed, it is most preferable if the molding or trim piece 50 is molded with a plurality of the onefastening members 10 attached thereto as part of the molding process.
- [0014] The one-piece fastening member 10 comprises a body portion having a distal end for insertion into an aperture associated with a housing structure or a side panel of a vehicle and a proximal end which is attached to or integrally formed with the molding or trim piece 50. The body portion includes a first opening which extends longitudinally for substantially the full length of the body portion and a second opening which extends transversely through both the first opening and the body portion. The body portion further includes resiliently flexible detents or

barbs spaced from the proximal end of the body portion for maintaining the body portion within the aperture associated with the vehicle side panel or other housing structure. Preferably, the detents or barbs are positioned and located in spaced, substantially parallel or aligned relationship from one another on opposed sides of the mechanism as will be hereinafter further explained.

[0015] The function of the present mechanism 10 is to fasten the molding or trim piece 50 to a housing or side panel structure which contains apertures into which the fastening mechanisms are inserted. Accordingly, the present mechanism must be sufficiently flexible throughout at least a portion of its length to compress into the aperture yet be sufficiently resilient to return substantially to its original shape after it is inserted therewithin. Further, it is important that the mechanism be strong enough so that it doesn't break during the insertion process or thereafter. This combination of strength, flexibility and resiliency is the result of the type of material from which the mechanism is made, its shape and size. Flexibility is provided by selecting a size and shape which affords flexing or bending of the distal end during the insertion process. For example, the length of the fastening mechanism 10 should

be at least approximately twice as long as it is wide and should include flex or bend points or areas to allow for compression of the distal end of the member 10 during insertion into a corresponding aperture. The mechanism 10 as illustrated includes bend or flex points on two sides of the distal end. Such bend or flex points can be provided by a sixconfiguration, especially a fastening member substantially in the shape of a hexagon. Another embodiment provides bend or flex points by utilizing a six-configuration wherein the bend or flex points are separated from one another by a distance which is less than the length of the side of the present mechanism which does not include bend points. Other sizes, shapes and configurations yielding the necessary flexibility and resiliency are likewise recognized and anticipated.

[0016] In order to provide a fastening mechanism that has the strength, flexibility and resiliency required, the present mechanism is molded, preferably by injection molding, using a material that can provide the appropriate strength, flexibility and resiliency. Any plastic material, either thermoplastic or thermoset, can be used, especially a thermoplastic elastomer. Especially preferred are polymers of polypropylene, as well as, polyethylene, thermo-

plastic polyolefins and acrylonitrile butadiene styrene.

When the fastening mechanism 10 is molded with the molding or trim piece 10, the material will be the same as that used for the molding or trim piece 50.

[0017] The present invention can be further understood by referring to the drawings wherein Figs. 2 more particularly disclose one embodiment of the present fastening member 10, the member 10 including a body portion 12 having a proximal end 14, a distal end 16, a pair of closed side wall portions 18, and a pair of partially open side wall portions 20 as best illustrated in Fig. 4. The body portion 12 includes a first opening 22 which extends longitudinally through substantially the full length of body portion 12 from the distal end 16 to the proximal end 14. Distal end 16 encloses opening 22. Fig. 3 illustrates a cross of the distal end 16 of one embodiment of the fastening member 10 wherein the distal end 16 includes bend or flex points 24 associated with opposed side portions 20 through which a second opening 26 extends therethrough as best seen in Fig. 4. The second opening 26 extends transversely through opposed side portions 20 of body portion 12 and through the first opening 22. In the embodiment of Figs. 1 the crossshape of the distal end 16 is

substantially a hexagon which forms bend or flex points

24.

[0018] Fig. 4 is a perspective view of the fastening mechanism 10 illustrating the closed side wall portions 18 and the side wall portions 20 which include the transverse opening 26. In this particular embodiment, the shape of the distal end portion 16 associated with opposed side portions 18 is concave whereas the shape of the distal end portion 16 associated with each of the respective opposed side portions 20 is convex. In a preferred embodiment, the fastening mechanism 10 includes a reinforced flange 30 associated with each of the bend points 24 located adjacent the distal end 16 to provide better strength properties to the fastening member 10 to avoid cracks and/or fatigue breakage during installation. As best illustrated in Fig. 4, the shape and size of the side portions 18 and 20 as well as the shape and size of the opening 26 form barbs or detents 32 on each opposed side portion 18. The detents 32 are positioned and located in spaced apart parallel or aligned relationship to each other on each side portion 18, the shape of the opening 26 substantially contributing to the formation of the detents 32. In a preferred embodiment, the opposed side portions 20 forming opening 26

taper along at least a portion of their length from the distal end 16 towards the molding or trim piece 50 or towards the proximal end 14 as best seen in Fig. 4. In a more preferred embodiment, the opposed side portions 20 forming opening 26 include two tapered portions along at least a portion of their length as illustrated in Fig. 4, the intersection of the two tapered portions defining a flexible barb or detent 32.

[0019] Fig. 5 is a cut away side elevational view of the fastening mechanism 10 integrally attached to a molding piece such as molding piece 50 that has been inserted into an aperture 34 associated with a housing structure 36 such as the side panel of a motor vehicle. Detents 32 are spaced from one another and from the proximal end 14 (Figs. 4 and 5) and are provided to ensure that the fastening mechanism 10 remains within the aperture 34 after it has been inserted therein. During insertion, side portions 20 around opening 26 flex sufficiently to allow insertion of the distal end 16 of the fastening member 10 through the aperture 34, yet side portions 20 are sufficiently resilient to return substantially to their original position after insertion. Detents or barbs 32 engage the periphery of aperture 34 after they pass therethrough and prevent the fastening

member 10 from being pulled back through the aperture 34.

[0020] Fig.6 illustrates a crossview of the distal end of another embodiment 38 of the present fastening member wherein the distal end 40 includes bend or flex points 44 associated with side portions 42 through which an opening similar to opening 26 extends therethrough. In this particular embodiment, the crossshape of the distal end 40 is such that the distance between the bend points 44 is less than the width of the closed side portions 46. In all other respects, the construction of embodiment 38 is substantially similar to the construction of fastening member 10.

[0021] In accordance with the teachings of the present invention, the molding or trim piece 50 may be inserted into the aperture 34 of housing structure 36 by inserting the fastening mechanism 10 into aperture 34 and thereafter providing pressure on the proximal end 14 through the molding piece 50. Such pressure causes the distal end 16 of mechanism 10 to bend or flex at bend points 24 along substantially the length of at least opening 26 allowing the member 10 to be inserted into the aperture 34 as illustrated in Fig. 5. Once the detents 32 pass through the aperture 34, pressure is released from the distal end 16

and the mechanism 10 returns substantially to its original form. Detents 32 then engage the housing structure 36 adjacent aperture 34 to hold the molding piece 50 in place adjacent the housing structure.

[0022] Accordingly, the present invention comprises a fastening mechanism for attaching a molding or trim piece to a housing structure wherein the fastening mechanism comprises a body portion having a distal end for insertion into an aperture associated with the housing structure and a proximal end attached to the molding piece, the body portion having a first opening which extends longitudinally for substantially the full length of the body portion and a second opening which extends transversely through the body portion whereby the body portion and the second opening define a plurality of resiliently flexible detents or barbs spaced from the proximal end of the body portion for maintaining the body portion within the housing aperture. By fabricating the molding piece 50 and fastening mechanism 10 or 38 as an integral device, molding pieces such as molding piece 50 can be easily and inexpensively produced for quick and easy attachment to a housing structure, such as a vehicle side panel, without loss of fastening pieces or other complications. In its pre-

ferred embodiment, the present mechanism includes bend or flex points in a sixdistal end configuration so that the fastening member is flexible yet strong.

[0023] Although the present fastening members 10 and 38 have been described in association with a typical molding or trim piece attachable to the side panel of a motor vehicle such as the molding piece 50 illustrated in Fig. 1, it is recognized and anticipated that the present fastening members can be utilized in association with any first member that must be attached to a second member wherein the second member includes an aperture for receiving the fastening member. It is also recognized and anticipated that the overall shape of body portion 12 may take on a wide variety of different configurations other than the six-configurations illustrated in Figs. 3 and 6. Still further, it is likewise recognized and anticipated that the shape of the transverse opening 26 extending through body portion 12 can likewise take on a wide variety of different sizes and shapes so long as the shape and size of the second opening in combination with the shape and size of the body portion define the plurality of resiliently flexible detents or barbs 32 which are utilized for maintaining the body portion or fastening member within an aperture as-

sociated with a typical housing structure.

[0024] Thus, there has been shown and described several embodiments of a novel onesnap fastening mechanism for use in attaching a first member to a second member, which fastening mechanism fulfills all of the objects and advantages sought therefor. As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the examples illustrated herein, and it is therefore contemplated that many changes, modifications, variations and other uses and applications of the present invention, including equivalents thereof, will become apparent to those skilled in the art after considering the specification and the accompanying drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.